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DALDINIA VERNICOSA—A PYROXYLOPHILOUS FUNGUS

ARTHUR S. RHOADS

(WITH PLATE 14)

The collector is thoroughly aware that numerous species of fungi occur prevailingly on burnt places. Although some of these forms are found elsewhere occasionally, many are so constantly associated with burnt places that they are sought only in such a habitat. In order to account for this peculiar association many plausible but inadequate reasons have been advanced. The fact remains, as stated by Seaver (1), that sterilization of the substratum by heat apparently brings about some change in the soil other than the simple elimination of competition in the destruction of bacteria and other fungi, which changes appear to be of vital importance in the cultivation of fungi which normally grow on a burnt substratum. Later experiments by Seaver and Clark (2), dealing with the artificial cultivation of a species of *Pyronema,* show that soil heated in various ways, especially by burning over the surface, becomes a very favorable nutrient medium for fungi of various kinds by reason of the large amount of food material rendered available through the heating of the materials in the soil. It is only natural to suppose that wood or bark, when burnt, likewise becomes a more favorable medium for the growth of certain fungi.

The writer has made several collections of *Daldinia vernicosa* (Schw.) Ces. & De Not. in various states throughout the East and generally finds it to be associated with fire-scorched trees. So far

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as can be determined this fungus is confined entirely to dicotyledonous trees but occurs upon a great number of species, preferably upon fire-scorched trunks. It attacks small saplings even more readily than larger trees and seems to prefer species of hickory for a host.

While making a survey of a burned area in the latter part of August, 1916, with a view to securing data in regard to the rapidity of the deterioration of standing fire-killed timber by one of our most common sap-rotting fungi, the writer was impressed by the abundance of *Daldinia vernicosa* on the dead trees. An area was selected near State College, Pa., that had been burned for the first time, a surface fire having swept through it 1 year and 3 months previously. As a result the trees on this area, with few exceptions, were scorched so badly that they were killed outright. From this burned area an average sample tract, 100 by 500 feet, was laid off and the following data were secured for each standing tree within this tract: species, diameter (measured to the nearest inch) at breast height, conditions (as to whether dead or living), and the species of fungi growing upon it as evidenced by the sporophores upon the trunk. The species of trees upon this tract in the order of their importance were white oak, scarlet oak, white pine, mocker nut hickory, red maple, chestnut, and pitch pine. The data obtained are given below, the trees being tabulated by diameter under each species:

Out of 71 scarlet oak trees upon this tract only 1 bore sporophores of *Daldinia vernicosa*. There also were present 15 red maples, 6 chestnuts, 37 white pines, and 1 pitch pine but no trees of these species bore sporophores. Out of a total of 363 dicotyledonous trees occurring upon this tract 46, or 13 per cent., bore sporophores of *Daldinia vernicosa* within 1 year and 3 months after the trees were scorched by fire. All the trees tabulated above, save one, were dead at the time of the reconnaissance.

The above figures clearly indicate how extensively and rapidly this ascomycete can propagate itself when afforded a favorable substratum. The accompanying photograph (Plate 14, *A*), taken in the latter part of August with a previous record of two months of dry weather, testifies to the luxuriant growth made by the

SUMMARY OF TREES BEARING SPOROPHORES OF DALDINIA VERNICOSA BY SPECIES AND SIZE

Species	D. B. H. inches	No. of trees on area	No. bearing sporophores of *D. vernicosa*	Per cent bearing sporophores of *D. vernicosa*
Quercus alba.....	2	12	3	25
" "	3	51	16	31
" "	4	37	5	14
" "	5	40	5	12
" "	6	33	6	18
" "	7	27	1	4
" "	8	19	0	0
" "	9	8	0	0
" "	10	3	0	0
" "	11	6	0	0
Quercus alba, total trees		236	36	15
Hicoria alba.....	1	7	2	29
" "	2	12	4	33
" "	3	6	2	33
" "	4	5	0	0
" "	5	3	0	0
" "	6	1	0	0
" "	7	1	1	100
Hicoria alba, total trees		35	9	26

sporophores of this fungus. Sporophores gathered and taken into the laboratory at this time shed copious quantities of spores.

Associated with *Daldinia vernicosa* was another pyrenomycete, *Nummularia Bulliardi* Tul. The stroma of this fungus is effused, thin, and crustaceous. It overspreads the surface of the inner bark, throwing off the epidermis for 6 inches or more in extent and is black and carbonaceous at maturity. This fungus, however, was found only on the white oak and scarlet oak trees. It is quite common throughout this region but always associated with dead oak trees. It is not, however, so restricted to fire-killed trees as is its associate, *Daldinia vernicosa,* but is apparently always associated with dead trees, preferably oak trees.

The genus *Daldinia* is characterized by the peculiar structure of the stroma, which is superficial, subglobose, and has a black and carbonaceous external layer when mature, in which the perithecia are imbedded. The stroma is softer inside, of a radiate-fibrous structure and concentrically zoned.

There are 24 species of *Daldinia,* mostly from the tropics, given

in Saccardo. For the most part they can be referred to *Daldinia concentrica,* which is a common and widely distributed plant occurring in almost every country in the world. In Australia this species assumes large size, frequently becoming two or three inches in diameter as it sometimes does in the western United States. In Europe, *Daldinia durissima* was proposed by Fries many years ago, but, according to Lloyd (3), no one else ever found it, a type at Kew being only the common *D. concentrica.* Massee found a specimen in tropical America (Trinidad) which he named *Daldinia aspera.* Lloyd, however, states that this specimen is not a *Daldinia* (3) at all but a Hypoxylon, probably *H. cerebrinum* (4). Léveillé discovered two species in the United States, *D. cingulata* and *D. loculata,* but Lloyd (3) states that both are the common *D. concentrica.* Two well-known and apparently distinct species of *Daldinia* occur within the United States, namely *D. concentrica* (Bolt.) Ces. & De Not. and *D. vernicosa* (Schw.) Ces. & De Not.

Peck (5), in his list of the plants of North Elba, reports *Daldinia vernicosa* on dead trunks of young, standing deciduous trees. He states that it is very doubtful if this and *D. concentrica* are really distinct species, and is of the opinion that connecting forms occur. It would appear that Peck had not collected *Daldinia vernicosa* as typified by the specimens in the Schweinitzian herbarium, for, if he had done so, it is difficult to see how such specimens could be considered identical with *D. concentrica.*

The stroma of *Daldinia concentrica* is subglobose or hemispheric, or rarely obovoid, while that of *D. vernicosa* is subturbinate and sometimes contracted behind into a thick stipe-like base which is often concentrically wrinkled. The stromata of both species become black when mature, but that of *D. vernicosa* becomes distinctly shining. When young and immature the stroma of *D. vernicosa* contains a large quantity of a colorless gelatinous substance which dries down at maturity, forming the radiate-fibrous substance between the concentric zones. At maturity practically all of the substance between the thin, blackish, concentric zones under the terminal, monostichous perithecial layer is made up of a colorless, radiate-fibrous, dry-gelatinous

substance. It is thus seen that the interior of the stroma of this plant is of a very heterogeneous texture. As a result of the loose texture of the radiate-fibrous inner substance the mature fruit-bodies can be crushed readily between the fingers. In *Daldinia concentrica* the interior of the stroma also is of a radiate-fibrous structure. Owing to its more homogeneous structure, however, it is fairly firm and solid, and specimens that have not been attacked by insects are very resistant to crushing. In the latter plant the radiate-fibrous substance is brown instead of colorless, as it is in

FIG. 1. Spores of *Daldinia vernicosa* showing various stages in the dehiscence of the exospore wall after treatment with dilute KOH; *a*, spore at time of shedding; *b*, spore showing the initial step in the dehiscence of the exospore wall; *c* and *d*, spores showing the casting off of the exospore membrane; *e*, cast-off exospore membranes, some with the valves still hinged together; *f*, a later stage of *e*, showing the return of the two valves to their original position. × 500.

D. vernicosa (Plate 14, *B*), and the concentric zones are not so sharply defined as those of the latter species. As pointed out by Ellis and Everhart (6) the perithecia of *D. concentrica* are monostichous and not polystichous as stated by Saccardo. But little difference is exhibited by either the perithecia, asci, or spores of the respective species. The spores of *D. concentrica* are obliquely uniseriate with the ascus, inequilaterally elliptical, dark-brown, and finally opaque. They are somewhat variable in size but usually conform to 12.5–18 μ by 7–10 μ. The spores of *D. vernicosa* are about the same size as in the preceding species but are somewhat smaller and less variable in size. They usually conform to the limits of 10–14.5 μ by 7–7.5 μ.

The spores of *Daldinia vernicosa* are peculiar in that, when mounted in dilute (5 per cent.) KOH or NaOH, the exospore wall, which is colorless, quickly dehisces and separates from the spore, which is dark-brown. A single peripheral line of dehiscence occurs at the center of the spore and the two halves of the exospore wall usually break away from one another as two valves, or they may dehisce partially and bend backward as if they were hinged, thus allowing the spore to free itself from its peripheral membrane (Fig. 1). The spores of *Daldinia concentrica* also exhibit the same behavior, and, with equal facility. These observations on the dehiscence and shedding of the colorless exospore wall of these two species, when the spores have been mounted in dilute solutions of KOH and NaOH as well as certain other dilute alkaline solutions, have been confirmed by the careful and repeated examination of specimens from widely distant points in several localities. This dehiscence of the exospore wall is less evident, however, in old herbarium material.

Ellis and Everhart (6) sum up the differences between *Daldinia vernicosa* and *D. concentrica* as follows: "This (*D. vernicosa*) is distinguished from *D. concentrica* by its shining-black stroma, and the looser texture of the radiate-fibrous inner substance which is cut by 8–12 dark-colored, membranaceous horizontal plates or layers. These are very noticeable in a vertical section even in the young plant, while it is still covered with the conidial layer and before the terminal, subglobose, ascigerous stroma has begun to appear. In the mature state, the fibrous inner substance and the horizontal membranes disappear to a greater or less extent, and leave the stroma more or less hollow, so that it may be easily crushed with the fingers, but in *D. concentrica* the inner substance remains firm and is also of a darker color."

Daldinia concentrica, according to Lindau (7), is of cosmopolitan occurrence on dicotyledonous wood, while *D. vernicosa,* according to Saccardo (8), is less widespread in its distribution. In addition, the latter species generally occurs on burned woody stems, whereas the former species does not seem to be pyroxylophilous.

It is often very difficult to secure mature specimens of *D. con-*

centrica, and sometimes exceedingly difficult to secure mature specimens of *D. vernicosa* that are free from insects. Even after excellent specimens are collected, the interior portions of the stroma usually are eaten out by the larvae that hatch out within the specimens, unless they are quickly oven-dried.

In addition to his own collections the writer has examined specimens of both plants in the herbaria of Dr. L. O. Overholts, The Pennsylvania State College, The New York State College of Forestry, Office of Pathological Collections in the U. S. Bureau of Plant Industry, the Schweinitzian herbarium in the Academy of Natural Sciences at Philadelphia, and the collections of the Office of Investigations in Forest Pathology. The Schweinitzian herbarium contains the type specimens of *Daldinia vernicosa,* which were first described as *Sphaeria vernicosa* by Schweinitz from specimens collected at Salem, North Carolina.

SUMMARY

1. *Daldinia vernicosa,* as is typical of certain other fungi, occurs prevailingly on a substratum of burnt wood, and is to be regarded as a pyroxylophilous fungus.

2. In its occurrence, it apparently is confined to dicotyledonous species and attacks fire-killed saplings, particularly those of hickory, with great vigor.

3. Out of a total of 363 dicotyledonous trees occurring upon an average sample tract (100 by 500 feet) of a burned area, 46, or 13 per cent., bore sporophores of *Daldinia vernicosa* within 1 year and 3 months after the trees were scorched by fire.

4. Of the 24 (mostly tropical) species of *Daldinia* given in Saccardo, most of them can be considered as mere growth forms or ecological expressions of *Daldinia concentrica,* a widely distributed plant of cosmopolitan occurrence.

5. Only two species of *Daldinia* occur in the United States, *D. concentrica* and *D. vernicosa,* which appear to be morphologically quite distinct.

6. The dehiscence of the colorless exospore wall occurs along a single central peripheral line and seems to be a characteristic feature of regular occurrence with the spores of both *Daldinia*

vernicosa and *D. concentrica,* when mounted in dilute alkaline solutions.

OFFICE OF INVESTIGATIONS IN FOREST PATHOLOGY,
BUREAU OF PLANT INDUSTRY,
WASHINGTON, D. C.

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EXPLANATION OF PLATE 14

A. Trunk of white oak (*Quercus alba* L.) one year and three months after it was killed by a light surface fire, showing the abundance of *Daldinia vernicosa.* The trunk bears a 6-inch rule.

B. Sporophores of *Daldinia vernicosa,* showing both external and sectional views, natural size.

DALDINIA VERNICOSA (SCHW.) CES. AND DE NOT.

NEW JAPANESE FUNGI

NOTES AND TRANSLATIONS—V

Tyôzaburô Tanaka

Physalospora minuta I. Miyake sp. nov. in Sangyô Shikenjô Hôkoku (Technical Report of the Imperial Sericultural Experiment Station), Tôkyô, Japan. 1[5]: 314, pl. 16, figs. 1–3, T. 5, xii, Dec. 1916. (Japanese.)

Perithecia sunk in the matrix, with ostiola erumpent, ellipsoid or globoid, 150–200 μ in diam. and nearly 125 μ in height; perithecial wall black, pseudo-parenchymatous; ostiola 45–50 μ long, about 40 μ across; asci clavate-cylindric, thick-walled above, 60–70 × 13–18 μ, paraphysate, octosporous; paraphyses filiform, abundant, forming thick periphysatic tissue; ascospores subbiseriate, fusoid or ellipsoid, obtuse, minutely granulate, 18–22 × 8–9 μ.

On living twigs of *Morus alba*.

Type localities: Gifu-ken, Kaidzu-gun, Shiroyama-mura, Mar. 1909, I. Miyake; Fukui-ken, Mar. 1909, K. Hara; Kyôto-fu, Ayabe-chô, Apr. 26, 1915, I. Miyake.

Illustrations: Three lithographic figures showing detailed structure of the fungus.

Mostly appears in presence of *Macrophoma minuta* Berl. the pycnidia of which are surrounded by blackened hyphae commonly known as subiculum, which occur simultaneously with the formation of perithecia of the present species. Symptoms of the two are identical, shown by minute, gregarious, elevated spots covering certain areas of the twigs. As to the evidence of genetic relationship between the two, since no ascogenous form of the former species has been reported, the new name is given as above.

Ascochyta mori I. Miyake sp. nov. in Sangyô Shikenjô Hôkoku (Imperial Sericultural Experiment Station, Technical Report), 1[5]: 345, Pl. 17, figs. 17–18, T. 5, xii, Dec. 1916. (Japanese.)

Pycnidia ellipsoid or conoid, immersed, later erumpent, with single, apical ostiolum, 160 μ across; ostiola papillate, dark-bordered; perithecial wall pseudo-parenchymatous, not very thick, paler inside, increasingly dark outwards; mycelia surrounding perithecial wall dark-colored, mixing with colorless ones which predominate farthest from pycnidia; pycnospores mostly elliptic, frequently cylindric with blunt ends, or ovoid, septate at the middle, not constricted, 9–11 $\times$ 3.5–4 μ, walls colorless, protoplasm pale-greenish, usually not conspicuously granulate but rarely one-nucleate in each cell; pedicel colorless and hyaline, short.

On branches of *Morus alba*.

Type localities: Fukui-ken prefecture, Japan, March, 1909, K. Hara; Idu-no-kuni, Shidzuoka-ken, Japan, Apr., 1909, I. Miyake.

Illustrations: Two black and white lithographic figures showing pycnidium and pycnospores.

Ascochyta moricola Berl. differs from this species in having dark-colored fusoid pycnospores pointed at both ends, and constricted at the septum.

Note: As the name *Ascochyta mori* has already been used by R. Maire (Ann. Myc. **11**[4]: 354, Aug. 1913), I propose a new name, *Ascochyta Miyakei* for this species.

STAGNOSPORA MORI I. Miyake sp. nov. in Sangyô Shikenjô Hôkoku (Technical Report, Imperial Sericultural Experiment Station), Tôkyô, Japan. **1**[5]: 348, pl. 17, figs. 22, 23. T. 4, xii, Dec. 1916. Japanese.)

Pycnidia sub-epidermal, walls of thick pseudo-parenchymatous tissue, dark-brown, ellipsoid or globoid, erumpent with short papilliform openings, 130–160 $\times$ 120–150 μ; ostiola black and darker than the pycnidial wall; pycnospores cylindric, slightly curved, sometimes inequilateral, rounded at both ends, 3-septate, one septum formed earlier, more or less constricted, colorless, hyaline, granulate, germinating from either end or from both at the same time; 21–26 $\times$ 6–9 μ; pedicel short, small; paraphyses filiform, straight or slightly curved and twisted, the innermost the longest, shortening toward the opening.

Illustrations: Two black and white lithographic figures showing pycnidium and pycnospores.

On twigs of *Morus alba*.

Type locality: Yamagata-ken (prefecture) Yonezawa-shi, Mar. 1915, I. Miyake.

It is often observed that the fungus causes the host tissues to disintegrate and usually only bast fibers are left unattacked.

ROBILLARDA MORI I. Miyake sp. nov. in Sangyô Shikenjô Hôkoku (Technical Report of the Imperial Sericultural Experiment Station), 1^5: 346, pl. 17, fig. 19. T. 4, xii, Dec. 1916. (Japanese.)

Pycnidia hypo-epidermal, later erumpent with a single ostiolum, black, globoid or ellipsoid, 200 μ across; ostiola papillate, short and small; pycnospores cylindric, 15–18 $\times$ 2.5–3 μ; more or less thickened at the middle portion, slightly rounded at the base, and rather pointed at the apex, straight or slightly curved, colorless to pale-greenish, septate at the middle, not constricted, with 3–4 bristles at the end; bristles equal in length.

On dead branches of *Morus alba* (rare).

Type locality: Fukui-ken prefecture, Japan, March, 1909, K. Hara.

Differs from *R. Cavarae* Tognin, which has pycnospores with long pedicels measuring 40–50 μ; and from *R. Celtidis* Scalia, characterized by having paraphyses 40–45 μ long.

CYTODIPLOSPORA MORI I. Miyake, sp. nov. in Sangyô Shikenjô Hôkoku (Technical Report, Imperial Sericultural Experiment Station), Tôkyô, Japan. 1^5: 347, pl. 17, figs. 20–21. T. 5, xii, Dec. 1916. (Japanese.)

Stromata scattered or gregarious, black, hemispherically elevated above, then disclosed, rupturing the epidermis, ½–⅔ mm. in diam., round or ellipsoid, pseudo-parenchymatous; pycnidia 4–5, sometimes more than 10 in one stroma, globoid or ellipsoid, with short, flat ostiola; pycnidial wall made up of finely and densely fascicled hyphae, colorless inside; pycnospores colorless, hyaline or pale-greenish, guttulate, cylindric with round ends, ellipsoid or ovoid, even, sometimes irregular, straight or curved, uniseptate, septa centric or eccentric, constricted or not constricted, variable in size, 6–15 $\times$ 3–5 μ.

On living twigs of *Morus alba*.

Type locality: Tôkyô-fu (prefecture) Nakano-chô, May, 1915, I. Miyake.

Illustrations: Two black and white lithographic figures showing pycnidia and pycnospores.

Found nowhere else, parasitic; mycelium intercellular and with haustoria entering the host cells.

DIMEROSPORIUM MORI Y. Endô sp. nov. in Dainippon Sanshi Kwaishô (Journal of the Sericultural Association of Japan), **26**[303]: 300, fig. B on p. 288, Apr. 1, 1917. (Japanese.)

Perithecia large, ellipsoid, 110–120 μ high, 130–140 μ across, without appendages, dark-brown; perithecial wall consisting of large cells containing several oil globules in each cell; asci numerous, clavate, thin-walled, 60–70 $\times$ 12–15 μ, 8-spored; ascospores almost definitely biseriate, oblong, subacute at both ends, 7–8 $\times$ 5–7 μ, yellowish-brown, uniseptate, with 1–2 shining oil globules in each cell.

Epiphytic on leaves of *Morus alba* (mostly on variety *Nezumigaeshi*), occurring with a species of *Meliola*. Catenulate hyphae, unicellular microconidia, multicellular macroconidia, gemmae, spermogonia, and pycnidia were observed, but it was not determined to which species they belong.

Locality: Ueda, Chiisagata-gun, Nagano-ken, Japan, nursery ground of Ueda Sericultural College, and mulberry fields of Tokida section east of the college grounds.

BUREAU OF PLANT INDUSTRY,
WASHINGTON, D. C.

NOTES AND BRIEF ARTICLES

Professor F. S. Earle spent some days at the Garden about the middle of August and then sailed for Porto Rico, where he will investigate for the United States Government a serious and rather obscure disease of sugarcane.

Mr. Stephen C. Bruner, formerly assistant pathologist at the Estación Experimental Agronómica, Santiago de las Vegas, Cuba, has been appointed pathologist to succeed Mr. John R. Johnston, now head of the Office of Sanadad Vegetal, Havana.

Venenarius pantherinoides, described by Murrill from Seattle in 1912, has recently been collected at Olympia, Wash., by Miss M. McKenny, who states that it was eaten by two persons with almost fatal results.

Mr. F. W. Haasis reports in the *Journal of Agricultural Research* for 1917 that young pines in plantations at Portland, Conn., were found to be dying around ant-hills, the trouble being usually associated with fungous and scolytid infestations. Ants are thought to be instrumental in spreading the disease.

In a recent number of *Science,* Professor Gage suggests an excellent method for the preparation of lantern slides showing diagrams, tables, etc. This consists in first covering the glass with a thin coating of varnish and then drawing upon it with a pen, using India ink. Such slides may be covered and bound if desired for permanent use.

An unprecedented danger from fire in the National Forests of the Northwest and Pacific Coast, owing to early drought, high winds, electrical storms, labor shortage, and depletion of the regular protective forces because of the war, has made necessary a

loan of $1,000,000 to the Forest Service from the President's special defense fund.

A particularly large and excellent collection of fungi, accompanied by beautiful photographs and many notes, has been sent to the Garden for determination by Henry J. Rust, of Coeur d'Alene, Idaho. This region is interesting because it lies near the boundary line between the Rocky Mountain region and the Pacific coast.

Several wood-destroying fungi have been recently sent in for determination by Professor R. J. Blair, of McGill University, Montreal; among them *Coriolus pubescens, Coriolellus serialis, Gloeophyllum trabeum, Lentodium tigrinum, Pyropolyporus conchatus, Phaeolus sistotremoides,* and *Micromphale ulmarium.* Specimens of *Lentodium tigrinum* are particularly well developed, which is rather rare for this species.

A gigantic specimen of *Ganoderma sessile* Murrill, a bracket fungus with a reddish, shining surface, was brought to the Garden early in September by Mr. Michael Dougherty, who found it at the base of a dead red maple in Central Park. The specimen in its dried state measured 18 inches across and consisted of several layers superimposed, making the entire cluster about 6 inches thick. This species has been said by some to be identical with *Fomes lucidus* of Europe, but it is quite certain that no European mycologist would recognize it in this New York form.

A serious disease of wheat, long known in Europe, has recently been found in certain parts of the United States, particularly in Virginia, where in some fields losses have been as high as 40 per cent. of the crop. The disease, caused by a small nematode, or eelworm, usually affects the wheat heads, although it may occur on all parts of the plant above ground. Affected heads stay green and ripen late and are smaller than those not affected. The chaff usually opens at a wide angle. In place of grains of wheat,

the affected heads contain dark, hard galls somewhat shorter and thicker than wheat grains. Control measures consist of planting only disease-free seed, practicing crop rotations, and preventing the spread of the nematodes from one field to another by means of infected soil which may cling to the feet of men or animals or to farm implements.

A recent paper by Stakman and others, in the *Journal of Agricultural Research,* treats of the impossibility of breeding cereals permanently resistant to rust. The facts recorded in the paper, supported by experimental work in the rust nursery and by field observations, indicate that rust resistance is comparable with other permanent characters, and that it is not primarily controlled by seasonal conditions, soil type, geographical location, or other cultural conditions. It is rather an hereditary character, which cannot be produced by the accumulation of fluctuating variations within a susceptible line, nor broken down by changes in the host or parasite. The resistance of wheat varieties may vary in different regions because of the presence of different biological forms of rust.

Mr. Frank N. Meyer, one of the most successful agricultural explorers ever employed by our Government, was missed from a steamer on the Yangste River early in June and his body was afterwards recovered. There were no indications as to the cause of death. Many duplicates of Mr. Meyer's collections of fungi in the Orient came to the Garden for determination and were deposited in the herbarium. Only recently, Mr. Meyer succeeded in discovering the chestnut canker on wild chestnut trees in China, the original home of the disease.

It is stated by Mr. J. B. Rorer that an alga, *Cephaleuros virescens,* causes a leaf-fall and die-back disease of cacao on practically every estate in Trinidad. This disease has been under observation since 1912 and has been described as attacking any cacao tree at any time during the year, but more readily during the last

two months of the dry season, especially if the trees are not in a good situation or condition. The disease has been called die-back and sun-scald, but the author suggests the name of algal disease in order to distinguish it from true die-back and sun-scald, which are said to be caused by a Diplodia. Spraying with Bordeaux mixture has been attended by beneficial results, and attention to tillage, drainage, shade, and protection from wind are also considered essential to the complete control of the disease.

In the *Journal of Agricultural Research* for 1918, W. H. Long and H. M. Harsch describe a method for differentiating various wood-rotting fungi by their cultural characters alone when grown upon artificial media. It is claimed that when cultural characters of closely related but really distinct species are compared, marked and constant differences in the character of the mycelium will be found on certain corresponding agars in the series of cultures representing the two species, while if the fungi are really of the same species, no constant differences will occur. Basing the conclusion on these facts, the authors state that unknown rots can be identified by making pure cultures of the causative organisms from diseased wood.

Professor Bruce Fink, of Miami University, has contributed the following note:

"On the fifth of September, 1918, I was called to examine what a farmer had brought to Oxford, Ohio, and was exhibiting as an unusual mushroom. I found the exhibit to be a cluster of *Clitocybe illudens*, 90 inches in circumference, 15 inches high, and 44 inches from one side over the top to the opposite side. The cluster was compressed-hemispheric in form. There were approximately 300 plants that stood out so that they could be seen readily, and some bystander thought there were as many as 400 in all, counting those that were compressed between the ones that were plainly visible. Seeing this unusual cluster of fungi recalls that in 1896, I found at Fayette, Iowa, a specimen of *Lycoperdon giganteum* which was 85 inches in circumference. The plant was of the usual form for this species, and was, as I recall, between

18 and 24 inches high. Unfortunately, I took only the measurement of the circumference. The plant would sit on top of a bushel-and-a-half basket of the usual form and extend beyond the basket on all sides."

In order to prevent a large percentage of loss in the new crop of potatoes after storing, the Department of Agriculture is making the following suggestions to farmers:

Get rid of every bit of vegetable matter in the storage cellar; sweep and brush until it is clean; then give a thorough dose of fungicide, either gas or spray, the quickest and easiest to apply being formaldehyde gas. For each 1,000 cubic feet of space, use 10 ounces of formaldehyde and 5 of potassium permanganate. Pour the formaldehyde over the permanganate in a deep container, and then leave the cellar immediately, because the gas is given off at once. Should it be found that these chemicals are too expensive, the Department recommends Bordeaux mixture of 5–5–50 strength. It may be applied with hand sprayer, pump, or broom; it is effective when thoroughly used and it does not cost much. It is expecting too much, says the department, to look for potatoes fit for market from a dirty, ill-ventilated cellar. Time, money, and work spent in growing a crop are wasted if the potatoes are stored where dead potatoes are carrying over the organisms that cause rots. Dry-rot attacks newly stored potatoes through bruises and wounds and spreads throughout the stored supply. Many farmers have cellars that now contain piles of sacks of potatoes, all rotten, sacks and all, and constituting a wet, foul mass that helps to decay the timbers and menaces the crop to be stored.

BYRON DAVID HALSTED

Professor Halsted died at his home in New Brunswick, New Jersey, on August 28, 1918, after a protracted illness. He had occupied the Chair of Botany in Rutgers College for nearly thirty years and had previously been professor in the Iowa State University.

Professor Halsted has served as a member of the Advisory Board of *"North American Flora,"* published by the New York Botanical Garden, since the commencement of that work in 1905; and, during the several years preceding, while it was in the organization stage, he was an active member of the group of American botanists who made the enterprise possible. He has been president of the Society for the Improvement of Agricultural Science and of the Botanical Society of America; edited the American Agriculturist for a period; and has also been one of the editors of the Torrey Botanical Club.

He was a highly successful and greatly beloved teacher and investigator of renown. His most important publications have been in the fields of agricultural botany and plant diseases, and they include over 300 titles. His loss is a deep personal bereavement to his many friends and professional associates.

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New names, and the final members of new combinations, are in **bold face type.**

* It has been considered unnecessary to include here the species listed in the three following articles, since they are already indexed or specially listed.

Arthur: Uredinales of Costa Rica. See p. 150.
Brenckle: North Dakota fungi. See p. 199.
Weir: Altitudinal range of forest fungi. See p. 11.